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Theory Of Mind And School Achievement: The Mediating Role Of Social Competence

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Social Understanding and School Achievement: The Mediating Role of Social Competence

Recent findings have highlighted the importance of children's social understanding – specifically their reasoning about beliefs and emotions – for school achievement. However, little is known about the processes that may account for such a relationship. In this longitudinal study we examined the role of children's social competence (as indexed by peer relationships and social skills), using a multi-informant and multi-indicator approach. We followed 73 children during the transition to primary school, gathering data at three time points: Time 1 (age 5), Time 2 (age 7) and Time 3 (age 8). Structural equation modelling showed that Time 1 social understanding predicted Time 2 social competence, which in turn predicted Time 3 school achievement, independently of verbal ability. Moreover, social competence mediated the relationship between early social understanding and later school achievement. Theoretical and practical implications of these findings are discussed.

Keywords: social competence, academic achievement, social understanding, theory of mind

Social Understanding and School Achievement: The Mediating Role of Social Competence

1.Introduction

Recent years have seen a dramatic increase in research on children's social understanding, defined as the ability to attribute inner states to oneself and others and to understand the links between these inner states and social behaviour (Wellman, Phillips, & Rodriguez, 2000). This interest is partly due to the fact that individual differences in children's understanding of mental states are clearly pertinent to different aspects of social behaviour, both in typical and atypical populations (e.g., Flavell, 2004; Hughes & Leekam, 2004). The present study takes as its premise the notion that social understanding is multi-faceted, made up of several components and processes. We focused on two key components: belief (making inferences about others' thoughts and beliefs) and emotion understanding (making inferences about emotions and feelings in given social scenarios). The importance of considering these components comes from studies showing that these two domains of social understanding develop concurrently (Hughes, 2011) and independently predict social preference (Fink, Begeer, Hunt, & de Rosnay, 2014).

Existing research has been mainly conducted with preschoolers. However, social understanding is likely to play an important role in children's school adjustment as social relationships are a key aspect of school life (Mashburn & Pianta, 2006). As Dunn (1995, p. 188) pointed out, "Children's adjustment to the world of school, to the judgments of teachers, to the peer culture... may all be linked to some features of their early understanding of others' inner states". Yet, despite these considerations, little research has been conducted to expand the study of social understanding beyond developmental psychology to include an educational perspective.

The paucity of research in this area can be explained by both methodological and theoretical reasons. First of all, investigating the effects of social understanding on schooling requires a longitudinal design with a reasonable number of children, which is highly labour-intensive and time-consuming. Second, extending research beyond early childhood implies assessing the multiple

sociocognitive skills possessed by school children, such as higher-order reasoning (Grueneisen, Wyman, & Tomasello, 2015; Perner, Kain, & Barchfeld, 2002) and recognition of complex emotions (Golan, Baron-Cohen, & Golan, 2008). In the present paper, we address both these issues, reporting on a longitudinal investigation of the relationship between children's social understanding and school achievement in primary school. In examining such an issue we were particularly interested in testing whether the hypothesized effect of early social understanding on later school achievement is explained, at least in part, by the mediating effect of children's social competence, expressed as the ability to build positive relationships and show social skills.

1.1 Social Understanding and School Achievement

Researchers are beginning to explore the repercussions of social understanding on school achievement (Wellman, 2016). A number of studies have indeed shown that children with a good level of emotional competence are more likely to develop a positive attitude toward school, to successfully adjust to the world of school and to improve grades and achievement (e.g., Denham, 2006). For example, Izard and colleagues (2001) showed that emotion knowledge (the ability to interpret and name facial expressions) at age 5 predicted children's school achievements at age 9. More recently, Denham and colleagues (2012) found that 3- and 4-year-olds' emotion knowledge predicted teacher-reported school success a few months later. Other studies have focused on emotion understanding, defined as the ability to infer others' emotions and to understand their links with social behaviour. Shields and colleagues (2001) reported emotion understanding as a significant predictor of young children's school adjustment. Another investigation showed that, after accounting for demographic variables, emotion understanding is directly associated with children's performance on a standardized school competence measure (Garner & Waajid, 2008). Finally, where cognitive aspects of social understanding are concerned, Blair and Razza (2007) showed that preschoolers' false-belief performance predicted later letter knowledge, even when individual differences in age, verbal ability, gender and family income were all taken into account.

Thus, even though belief and emotion understanding can be meaningfully differentiated (Cutting & Dunn, 1999; Fink et al., 2014), they both potentially play a role in children's school achievement. This perspective fits with results of McKown, Russo-Ponsaran, Allen, Johnson and Warren-Khot (2015) showing that social-emotional comprehension of children aged kindergarten through fifth grade was related to reading performances. This is also consistent with theoretical work and empirical evidence showing that belief understanding and emotion understanding, while clearly distinguishable, are intimately related indicators of a broader, overarching social understanding construct (Caputi, Lecce, Pagnin, & Banerjee, 2012; Hughes et al., 2000; Hughes et al., 2014; Lecce & Hughes, 2010).

A crucial next step is to learn more about the developmental processes that connect social understanding with school achievement over time. First of all, new longitudinal evidence is needed to elucidate the timing of the associations during the school years. For example, we need to determine whether early social understanding predicts higher school achievement over a period of time. Furthermore, understanding this developmental pathway in turn depends on having an insight into the explanatory mechanisms that may account for the relation between early social understanding and later school outcomes.

1.2 The Mediating Role of Social Competence

One such mechanism concerns children's social competence, expressed as the ability to build positive relationships and to behave effectively in social contexts (Rose-Krasnor, 1997). A growing number of studies show a developmental association between children's social understanding and social competence at school (Slaughter, Imuta, Peterson, & Henry, 2015). With reference to peer relationships, for example, Banerjee and colleagues have demonstrated that individual differences on an advanced measure of social understanding are negatively associated with individual differences in peer rejection (Banerjee & Watling, 2005). They also present evidence for a bidirectional model according to which early peer rejection impairs the acquisition of social understanding, and difficulties in social understanding, in turn, predict increased peer

rejection (Banerjee, Watling, & Caputi, 2011). More recently, Caputi and colleagues (Caputi et al., 2012) showed a relationship – mediated by improvements in prosocial behaviour – between social understanding in preschool and lower peer rejection and higher peer acceptance two years later in primary school.

This pattern of connections between social understanding and peer relations is likely to reflect systematic variations in how children behave socially (Hughes & Leekam, 2004). Children with more advanced social understanding are indeed found to exhibit a higher frequency of prosocial behaviour (Caputi et al., 2012; Ensor, Spencer, & Hughes, 2011), to adopt socially competent forms of conflict resolutions with siblings (Foote & Holmes-Lonergan, 2003; Randell & Peterson, 2009), and to show greater social competence (Peterson, Slaughter, & Paynter, 2007). Conversely, impaired social understanding has been suggested to be an important contributor to the development of antisocial behaviours and conduct problems (Hughes, & Ensor, 2007; 2009; Sharp, 2006, 2008; Sharp, Croudace, & Goodyer, 2007), even if antisocial behaviour may arise for various reasons in different individuals (see Hughes, 2011). Nonetheless, the evidence reviewed above provides a strong basis for expecting children's social understanding to serve as a crucial predictor of the quality of children's social competence in the context of the classroom.

We believe that this connection between social understanding and social competence in turn provides an important key to understanding children's school achievement. A growing body of research shows that peer acceptance and rejection are strong predictors of school readiness and school success (Ryan & Ladd, 2012). In a pioneering investigation on this issue, Ladd, Kochenderfer, and Coleman (1997) reported that children's relationships (friendship, peer victimization, and peer acceptance) significantly contribute to school affect, school liking and school performance during kindergarten and Buhs and colleague showed that rejected children were more likely to show a decrease in academic achievement in the short (Buhs & Ladd, 2001) and long term (Buhs, Ladd, & Herald, 2006).

Again, these patterns are likely to reflect the significance of social behaviour patterns.

Numerous studies have, indeed, demonstrated that prosocial and well-behaved children are more likely to report better school outcomes than antisocial and aggressive ones (DiPerna & Elliott, 1999; Wentzel, 1993). Notably, the relation between ratings of social competence and school achievement is longitudinal as well as concurrent. For example, Maleki and Elliott (2002) found that students' social competence, as rated by teachers in the fall of Year 3 and 4, is a significant predictor of their spring academic competence. In a similar vein, Caprara and colleagues (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000) showed that children's third-grade prosocial behaviour predicts their eighth-grade school achievement, even after controlling for variation in early school achievement. Whereas prosocial and socially competent behaviours seem to foster school engagement and success, peer problems and aggression are risk factors for school outcomes. Indeed, children with higher levels of externalizing behaviour between toddlerhood and school-age are at increased risk of academic difficulties throughout later childhood and adolescence (Campbell, Spieker, Burchinal, & Poe, 2006; Fergusson & Horwood, 1995). For example, Brennan, Shaw, Dishion, and Wilson (2012) reported that age 2–3 aggression was a significant predictor of age 7.5 academic performance and van Lier and colleagues (2012) showed that externalizing problems at age 6 led to academic underachievement at age 7.

Still more convincing reasons for expecting a significant association between individual differences in children's social competence and school achievement come from intervention studies. Recently, Durlak and colleagues reported results on a meta-analysis on 213 social-and-emotional-learning (SEL) programs designed to foster students' self-awareness, self-management, social awareness, relationship skills and decision making from kindergarten through high school (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Interestingly, results showed that the SEL programs not only yielded positive effects on targeted competencies (i.e., social and emotional skills), but also positively influenced children's school achievement (measured by math and reading tests) over a period of six months.

In confirmation of these speculations about the role of social competence in mediating the relationship between social understanding and school achievement, two studies have so far addressed this topic with a short-term longitudinal design. The above cited study conducted by Denham and colleagues (2012), for example, showed that preschoolers' social-emotional behaviour mediates the relation between emotion knowledge and subsequent school success. Along the same lines, the study conducted by Ziv (2013) found that preschoolers' social competence partially mediates the relation between social information processing and school readiness. In both these studies, therefore, preschoolers' early sociocognitive and emotional skills predicted different aspects of subsequent school achievement (school adjustment, language, literacy, mathematical thinking, general knowledge and learning behaviours) by means of a *social* mediator. It is also important to note here that the seminal paper by Izard and colleagues (2001), although it did not explicitly test this particular mediation model, showed that individual differences in emotion knowledge at age 5 significantly predict teachers' ratings of children's social skills at age 9 which, in turn, were significantly related to school achievement.

In sum, there is a strong base for the argument that social competence is a crucial lynch-pin that connects social understanding with school achievement. Drawing on recent advances regarding this topic, we used a multi-informant and multi-indicator approach to provide a broad representation of the underlying social competence construct. We measured children's peer relationships (through peer nominations) and social skills when interacting with classmates (through teachers' ratings). For the evaluation of peer relationships we examined the extent to which a child is liked (peer acceptance) or disliked (peer rejection) by his/her classmates. The separate measurement of acceptance and rejection is used because, even though these variables are moderately (inversely) related one another, they cannot be considered simply as polar opposites (Bukowski, Sippola, Hoza, & Newcomb, 2000). Moreover, we combined the sociometric nominations with teacher ratings of children's social maturity and of conduct problems; again, while the latter negative social behaviours within a classroom are certainly important (Burt & Roisman, 2010; van Lier et al.,

2012), positive social behaviours are also likely to be a powerful predictor of school achievement as children grow up (Caprara et al., 2000).

Our multi-informant approach fits with results of existing literature showing significant correlations, both within and across time, between teachers' rating of social competence and peer ratings of social preference (Chen, Wang & Cao, 2011; Fink, de Rosnay, Peterson, Slaughter, 2013; Ladd, 2005; Newcomb, Bukowski, & Pattee, 1993). It is also important to note that those studies that have adopted a structural equation modelling approach to the study of social competence have combined teacher and peer reports to form composite robust measure (Caprara et al., 2000; Welsh, Parke, Widaman, & O'Neil, 2001).

1.3 The Present Study

The work reported below had two main goals. First, we investigated the existence of a longitudinal relationship between early social understanding and later school achievement. The second aim was to examine the role of children's social competence in this association, given the evidence above that social understanding predicts social competence and that social competence predicts school achievement. In addition, since verbal ability has been linked with both social understanding (Milligan, Astington, & Dack, 2007) and school achievement (Hohm, Jennen-Steinmetz, Schmidt, & Laucht, 2007; Taanila, Murray, Jokelainen, Isohanni, & Rantakallio, 2005), the present study also evaluated whether the above expected associations were independent of children's verbal ability.

In order to address these aims, we report results from a bigger longitudinal study designed to investigate socio-cognitive predictors of children's school adjustment. For the purpose of the present study we focused on three time points, when the children were aged 5, 7, and 8 years (with the first time point in kindergarten, and the later time points in Years 2 and 3 of primary school). Previous studies reporting on data from the same empirical programme have already shown that children's social understanding at age 5 significantly predicts higher peer acceptance and lower peer rejection (Caputi et al., 2012) and level of school achievement at ages 7 and 10 (Lecce et al., 2011, 2014b).

In the study reported here, we integrated the social and cognitive domains of school adjustment for the first time in this large programme of work by evaluating pathways connecting social understanding at age 5, social competence at age 7, and children's actual performance at age 8 on math and reading tests together with teachers' ratings. In line with the previous work, we expected that individual differences in preschool social understanding would predict individual differences in children's school achievement (in the third year of primary school) over and above verbal ability. Most importantly, we also tested the hypothesis that social competence would mediate the association between early social understanding and later school achievement.

2. Materials and Method

2.1 Participants

A sample of 84 children was recruited in kindergartens to take part in a longitudinal study on socio-cognitive predictors of school adjustment. This paper presents data from the 73 children (41 boys) for whom we have complete data on the three key variables of this study: social understanding in the last year of preschool (Time 1), peer relationships in Year 2 of primary school (Time 2) and school achievement in Year 3 of primary school (Time 3). Children were 5 years old ($M = 64.38$ months, $SD = 3.93$ months, range = 52-65 months) at Time 1, 7 years old ($M = 90.38$ months, $SD = 3.29$, range = 83-96 months) at Time 2, and 8 years old ($M = 103.3$ months, $SD = 3.13$ months, range = 97-109 months) at Time 3. The schools were located in a city of Northern Italy and surrounding towns, in areas with mixed socioeconomic backgrounds. At Time 1, children were attending 13 different kindergartens (16 classes): 11 public schools (13 classes), and two private schools (three classes). At Time 2, children moved to 18 different primary schools (21 classes): 17 public schools (20 classes) and one private school (one class). In each class there were two main teachers. At Time 3, none of the study children changed schools. All the children were of Caucasian origin and native Italian speakers. No participant was clinically referred for cognitive or learning difficulties.

With regard to parental occupation, 18% of the fathers were in professional/managerial occupations, 46% were in skilled non-manual occupations, and 36% were in manual occupations or unemployed; 12% of the mothers were in professional/managerial occupations, 55% were in skilled non-manual occupations, and 33% were in manual occupations or unemployed. With regard to parental education, 40% of fathers and 25% of mothers had a University degree, 33% of fathers and 50% of mothers had high school diploma, and 27% of fathers and 25% of mothers had General Certificates of Secondary Education. In terms of family structure, 100% of children came from two-parent families; 36% of the children were singletons, 56% had one sibling, 7% had two siblings, and 1% had three siblings.

2.2 Procedure

At every time point, each child completed a battery of social understanding tasks and a verbal ability task. At Time 2 we evaluated children's social competence using sociometric nominations to assess peer relationships and teacher's ratings to assess social competence. Finally, we gathered children's school achievement at Time 3 via both children's performance on reading and math tests and teacher's ratings. All children were tested individually in an empty classroom of the (pre)school every year between March and April.

2.3 Measures

2.3.1 Verbal ability. Children's verbal ability was assessed using the Peabody Picture Vocabulary Test - Revised (PPVT-R, Dunn & Dunn, 1981; Italian version by Stella, Pizzoli, & Tressoldi, 2000) at Time 1 and the Test for Reception of Grammar (TROG - Bishop, 1982; Italian adaptation: Cendron, Lonciari, & Sartori, 1995, personal communication) at Time 2 and Time 3. The PPVT-R measures children's receptive language. The experimenter reads a word and presents four pictures to the child, who is then asked to point to the picture that best represents the word (e.g., "Can you show me the dog?"). The TROG measures children's understanding of sentences (and not only single words). The child is asked to choose a picture from four alternatives that best corresponds to the meaning of the sentence read aloud by the experimenter. This test comprises 80

items, divided into 20 blocks, presented in a fixed order. Each block contains four items that measure the same syntactic ability. Since the latter verbal ability test focuses on grammar structures, it gave us the possibility to operate a more stringent control for verbal ability in our analyses. It should be noted that the verbal ability measures were robustly correlated with each other across the three time points ($r_s > .40$, $p_s < .001$).

2.3.2 Social understanding. At each time point social understanding was evaluated through belief and emotion understanding tasks. Belief understanding was assessed with a battery of false-belief at Time 1 (Hughes et al., 2000) and age-relevant subtests of the Theory of Mind Test (TMT - Pons & Harris, 2002) at Time 2 and 3. Emotion understanding was assessed with a battery of emotion understanding tasks at Time 1 (Hughes et al., 2000) and age-relevant subtests of the Test of Emotion Comprehension (TEC - Pons & Harris, 2000) at Time 2 and 3. The strategy of selecting specific subtests from these two scales has been successfully used in existing studies (De Stasio, Fiorilli, & Di Chiacchio, 2014; Lecce, Bianco, Demicheli, & Cavallini, 2014) as it allows us to tap into individual differences on developmental appropriate skills rather than define the level of development. More details on these tasks are given in the Appendix.

2.3.3 Social competence At Time 2 children's social competence was evaluated through teachers' and peers' ratings. Teachers were asked to evaluate children's social competence by completing the Conduct Problems scale of the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997) and the Social Maturity Scale (Peterson et al., 2007). The Conduct Problems subscale is made up of 5 items and evaluates the frequency of problems in the child's social relationships on a 3-point scale (e.g., "Often fights with other children or bullies them") (range 0-10). The Social Maturity Scale is made up of 7 items and considers children's social skills for interacting with their peer group (e.g., "The maturity of the child's everyday modes of playing sociably with peers"). Items were rated on a 7-point scale, from 1 = "very far behind the average child this age" through 4 = "about average for children this age" to 7 = "very far ahead of the average child this age" (range 7-49). Peers' ratings were collected following Coie, Dodge and

Coppotelli's (1982) procedure. Children were asked to nominate three classmates of either sex whom they most liked (ML) and three classmates whom they least liked (LL). The numbers of ML and LL nominations received by every child were standardized within each classroom to give a measure of children's peer acceptance (ML) and rejection (LL). Peer nominations were provided by the entire class of each participating child; every child made the nominations by identifying names from a complete class roster.

2.3.4 School achievement. At Time 3 we assessed children's school achievement using teachers' ratings on the academic competence subscale of the Social Skills Rating System (SSRS - Gresham & Elliott, 1990) and children's performance on reading (MT - Cornoldi & Colpo, 1995) and math tests (AC-MT - Cornoldi, Lucangeli, & Bellina, 2002). The academic competence subscale of the SSRS is made up of 9 items. Teachers are asked to rate each single child's performance in comparison with other children in the classroom using a 5-point Likert scale: 1 represents the lowest 10% of the class, 2 the next lowest 20%, 3 the middle 40%, 4 the next highest 20% and 5 the highest 10%. Scores thus ranged between 9 and 45. The MT reading comprehension task consists of a passage that children have to read silently without time limit. After reading, children were required to answer ten multiple-choice questions. All questions probed inferential information. One point was credited for each correct answer, hence scores ranged between 0 and 10. The AC-MT math test consists of a standardized math battery for third graders evaluating four math abilities: judgement of numerosity, transformation from letters into numbers, and re-writing a series of numbers in order of increasing and decreasing size. Each of these four components is made up of three items. One point was credited for each item completed correctly, hence scores ranged between 0 and 12.

3. Results

We begin by showing descriptive analyses and by considering gender differences and associations between variables. We then report results of structural equation modeling to assess the mediating role of social competence in the relation between social understanding and school

achievement. This hypothesis was tested through Mplus software for structural equation modeling.

Analyses with latent variables in Mplus allowed us to evaluate longitudinal associations between

Table 1.

Means, Standard Deviations, and possible ranges of Verbal Ability (VA), Social Understanding (SU), Social Competence (SC) and School Achievement (SA) Measures at All Time Points

	Measure	<i>M (SD)</i>	Range
Time 1	VA	74.80 (17.97)	0-175
	SU - Belief understanding	5.04 (2.07)	0-10
	SU - Emotion understanding	9.03 (1.97)	0-12
Time 2	VA	15.04 (2.92)	0-20
	SU - Belief understanding	6.30 (1.36)	0-10
	SU - Emotion understanding	4.16 (1.31)	0-6
	SC - Most like nominations	.42 (.97)	-
	SC - Least like nominations	-.23 (.79)	-
	SC - Social Maturity	30.72 (7.06)	7-49
	SC - Conduct Problems	6 (1.62)	5-15
Time 3	VA	16.49 (2.33)	0-20
	SU - Belief understanding	6.89 (1.66)	0-10
	SU - Emotion understanding	4.11 (1.25)	0-6
	SA - Reading task	7.84 (1.36)	0-10
	SA - Math task	10.08 (1.47)	0-12
	SA - Academic competence subscale	33.95 (7.47)	9-45

social understanding, social competence and school achievement, providing error estimates and controlling for verbal ability.

3.1 Preliminary Analyses

Descriptive statistics for all the study variables at each time point are presented in Table 1. A series of independent-samples t-tests showed no significant gender differences on any study measure. Therefore, we report findings for the whole sample collapsed across gender.

Table 2 shows the correlations among all the study variables. As expected, verbal ability was generally related to belief understanding and emotion understanding within each time point. Table 2 also shows that early and concurrent verbal ability was significantly associated with Time 2 positive aspects of social competence and with Time 3 school achievement. Thus, we controlled for verbal ability in our main analyses.

Preliminary inspection of modification indices indicated significant error covariances between the peer acceptance and peer rejection scores at Time 2 (not surprising given the common informants), and between the Time 1 social understanding construct and the Time 2 verbal ability measure (also conceptually reasonable in view of evidence regarding specific links between social understanding and grammatical constructions; see Milligan, Astington, & Dack, 2007). These two error covariances were therefore included in the model.

Our hypothesized relations were confirmed by the analyses (see Figure 1). The observed value of RMSEA demonstrates satisfactory model fit (Steiger, 1990). Results show that Time 1 social understanding predicted social competence at the subsequent time point, which, in turn, predicted school achievement later on. Moreover, the direct path from Time 1 social understanding to Time 3 school achievement was non-significant. We evaluated our hypothesized indirect (mediated) pathway, calculating standardized estimates in the Mplus model. It should be noted that we accounted for the direct effect of the initial variable (social understanding) on the outcome variable (school achievement) even though it was non-significant, in order to ensure the most accurate estimate of the indirect effect. The indirect effect of Time 1 social understanding on Time 3 school achievement, mediated by Time 2 social competence, was found to be significant (standardized indirect estimate = .42, $p = .038$).

Table 2.

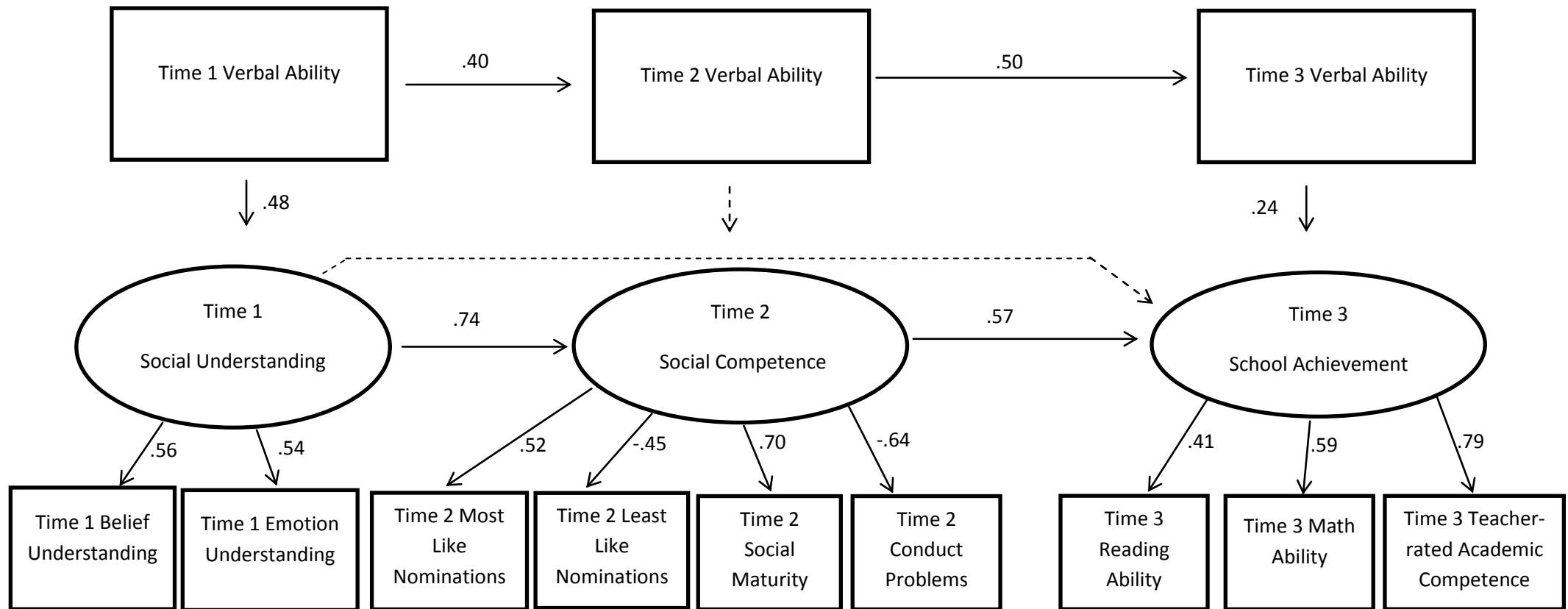
Correlations between study measures: Verbal Ability (VA), Belief Understanding (BU), Emotion Understanding (EU), Most-Like Nominations (ML), Least-Like Nominations (LL), Social Maturity (SM), Conduct Problems (CP), Reading Test (RT), Math Test (MT), and Academic Competence (AC).

		Time 1		Time 2							Time 3					
		BU	EU	VA	BU	EU	ML	LL	SM	CP	VA	BU	EU	RT	MT	AC
Time 1	VA	.35**	.26*	.42***	.04	.33**	.25*	-.16	.21 ⁺	-.05	.40***	.22*	.30**	.24*	.34*	.28*
	BU	-	.28*	.39**	.01	.20	.38**	-.21 ⁺	.25*	-.10	.27*	.22 ⁺	.21 ⁺	.11	.32**	.39**
	EU		-	.34**	.09	.26*	.21 ⁺	-.24*	.37**	-.27*	.24*	.34**	.15	.28*	.24*	.39**
Time 2	VA			-	.09	.39**	.22*	-.16	.39**	-.18	.52***	.31**	.34**	.34***	.45***	.49***
	BU				-	.19	.11	.10	.10	-.02	.08	.25*	.17	.02	-.01	-.06
	EU					-	.26*	-.31**	.29*	-.25*	.32**	.12	.32**	.14	.45***	.28*
	ML						-	-.54***	.39***	-.29*	.23*	.21	.40***	.04	.19	.45***
	LL							-	-.30**	.33**	-.20	-.02	-.13	-.04	-.18	-.38**
	SM								-	-.45***	.44***	.20 ⁺	.30**	.14	.26*	.61***
	CP									-	-.30**	-.14	-.15	-.37**	-.38**	-.49***
Time 3	VA										-	.42***	.54***	.38**	.51***	.45***
	BU											-	.36**	.28**	.32*	.18
	EU												-	.07	.35**	.30**
	RT													-	.35**	.29*
	MT														-	.49***

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; ⁺ $p < .09$ (all significance tests are two-tailed).

An inspection of modification indices showed no significant links from any of the indicator variables to the subsequent constructs over and above the pathways between the latent variables. Specifically, neither belief understanding nor emotion understanding appeared to have distinctive value for predicting the subsequent constructs in the analysis, over and above the shared variance reflecting the latent social understanding construct. Finally, we found that the indirect effect of Time 1 social understanding on Time 3 school achievement was virtually unchanged even after entering subsequent measures of social understanding at Time 2 and Time 3 (standardized indirect estimate = .41, $p = .039$); the latter, in fact, did not significantly predict Time 3 school achievement above and beyond the distal effects of Time 1 social understanding.

Figure 1. Structural equation model of relationships between Social Understanding, Social Competence, and School Achievement over the three time points, controlling for verbal ability. Model fit statistics: $\chi^2(47, N = 73) = 64.42, p = .046$, root-mean-square error of approximation = .07. Displayed path coefficients are standardized estimates from Mplus, all significant with alpha set to .05. Dashed arrows indicate non-significant paths. Error terms are not displayed.



4. Discussion

The present study takes as its starting point the premise that the understanding of mental states has a critical interface with children's development not only in the social (Banerjee et al., 2011; Caputi et al., 2012) but also in the cognitive domain (Burr & Hofer, 2002; Lockl & Schneider, 2007). To date, the cognitive consequences of children's social understanding have received surprisingly little research attention, even though it is known that the ability to infer beliefs serves as a key foundation for scientific thinking (Kuhn & Pearsall, 2000), for the understanding of the interpretive nature of knowledge (Carpendale & Chandler, 1996) and for beliefs about learning (Lecce, Caputi, & Pagnin, 2009; Lecce, Caputi, & Pagnin, 2014c). The analysis of results from the present study not only confirms that early (preschool) social understanding predicts children's school achievement three years later but that this pathway is mediated by variations in children's level of social competence. Interestingly, this pattern of associations was independent of children's verbal ability and concurrent level of social understanding.

4.1 Social Understanding and School Achievement: A Social Explanation

Our first main finding was the significant longitudinal association between children's social understanding and school achievement: children who outperformed their peers on mental-state understanding tasks in preschool were more likely to achieve better academic results three years later, independently of their verbal ability. Moreover, the link between social understanding and school achievement appears to be distal rather than proximal. Indeed, we found that Time 1 social understanding predicted unique variance in Time 3 school achievement, and that adding concurrent (Time 3) social understanding did not alter this relationship. Interestingly, the few longitudinal studies that have included measures of social understanding at more than one time point, have also stressed the relevance of across-time, rather than concurrent, associations between social understanding and a variety of outcomes including children's talk with friends about thoughts and feelings (Hughes et al., 2011) and sensitivity to criticism (Cutting & Dunn, 2002; Lecce et al., 2014b; Lecce et al., 2011). This distal effect might indicate that individual differences in

preschoolers' social understanding have particular significance and are able to capture crucial features of the ability to understand others. On the other hand, other recent work has also shown a distal effect of social understanding in older children; performance on social understanding at age 10 was found to predict later metaknowledge about reading comprehension at age 11 (Lecce, Zocchi, Pagnin, Palladino, & Taumoepeau, 2010). One intriguing explanation is that social understanding at different ages generate variations in other dimensions that, in turn, are relevant to the social and cognitive outcomes outlined above.

This brings us to the main focus of the present research, namely the mediating role of social competence in the association between early social understanding and school achievement. The core finding of the present study is that children's social competence (as evaluated via both teachers' and peers' reports) at 7 years of age mediated the association between social understanding at 5 years of age and school achievement at 8 years of age. Although conclusive statements about causality cannot be made, this developmental pathway suggests that social understanding may be important for success in school because it affects children's social relationships and behaviours which, in turn, are associated with school achievement. In other words, children's social understanding could sustain children in building positive relationships within the class by reducing the risk of peer rejection and antisocial behaviour, and this social competence, in turn, helps children to capitalize on learning situations and to increase school achievement.

Generally speaking, this result fits with the view that children's abilities to cope with the social environment in the early school years are important factors in predicting academic performance (Entwisle & Hayduk, 1988; Lynch & Cicchetti, 1997; Pianta, Steinberg, & Rollins, 1995). Indeed, children at school are exposed to a new community of unfamiliar peers and adults, and the extent to which they are equipped with the socio-cognitive abilities necessary to fit into this new social environment is crucial for their school success. Notably, children continue to take advantage from their social experience in the classroom as they progress through primary and middle school, and the associations between social competence and academic outcomes remain

significant after controlling for gender, ethnicity, and cognitive ability (Hamre & Pianta, 2001). The present paper also contributes to a growing body of research emphasizing learning-related experiences in the classroom and, in particular, the quality of children's interactions at school (Binnie, 2005; Davis, 2003; Denham, 2006; Garner & Waajid, 2008; McDermott, Leigh & Perry, 2002; Roorda, Koomen, Spilt, & Oort, 2011).

From a more theoretical point of view, our results fit with the idea that learning and academic self-development are socially situated and rely heavily on interpersonal relationships. Students learn in close collaboration with peers and teachers; therefore, children's academic engagement and success are likely to be strongly influenced by the quality of these social relationships. Such an interpretation is also in accord with the ecological perspective of socio-cognitive theories (Bandura, 1997; Vygotsky, 1962) that posit that children's cognitive development is strongly influenced by the social environment and by interpersonal relationships. Accordingly, the construct of school readiness has been extensively revised over the last two decades in order to include not only cognitive factors but also social understanding and social relationships as prerequisites of successful school entrance (for reviews, see Denham, 2006, and Mashburn & Pianta, 2006).

In considering the associations between social competence and school achievement, researchers have also started to investigate the moderators and mediators that might be involved. As noted earlier, skills in executive function and emotional regulation are likely to be crucial for translating mature social understanding into effective social behaviour. Indeed, evidence strongly suggests that the ability to regulate one's emotions is a crucial predictor of children's school achievement as it underlies children's ability to focus selective attention and to learn (Blair, 2002). For example, two separate studies have reported a significant relationship between emotion regulation and children's academic competence (measured via both teacher's ratings and children's scores on formal tests) at age 5 (Graziano, Reavis, Keane, & Calkins, 2007) and in Year 1 of primary school (Trentacosta & Izard, 2007). This may be related to broader influences of executive

function and self-regulatory skill. For example, Hughes and Ensor (2011) in a recent paper from the Toddlers Up longitudinal study showed that 6-year-old children's self-perceived academic competence was significantly related to variation in executive function improvement from age 4 to age 6. A key direction for further research is therefore to identify the interaction between social understanding, executive function, and emotion regulation in predicting children's peer relationships, social behaviour, and subsequent school achievement.

We should also situate the patterns observed in the present study within the wider social context, both in the school and beyond. Several hypotheses (not always directly tested) have been proposed about the link between social competence and academic learning. The first focuses on children's level of concentration on school tasks. According to this, difficulties in peer relationships may hinder the learning process because children get distracted from the learning situations (Welsh, Parke, Widaman, & O'Neil, 2001). The second hypothesis focuses on peer group as a learning context that may facilitate school outcome. In this view, Chen, Rubin and Li (1997) reported that popular children are also more likely to be cooperative, thus creating an environment that is conducive to learning, and to receive aid from classmates during class work if needed.

The third, and perhaps more intriguing, hypothesis is that social relationships impact on children's school liking and affect their motivation to learn. The most convincing evidence for such a process comes from the research conducted by Ladd and colleagues in the last fifteen years (for a review see Ladd, 2003). In a series of related studies they showed that the relation between peer rejection and school achievement is mediated by the negative treatment children receive from peers and reduced engagement in classroom activities. Interestingly, they found support for such a model both in young children attending kindergartners (Buhs & Ladd, 2001) and in older children (Buhs, 2005). More precisely, in a longitudinal study Buhs et al. (2006) followed a group of children from kindergarten through the 5th grade and showed that the effect of peer rejection on school achievement endures over time and is partially mediated by peer exclusion and classroom

participation. Thus, children with poor peer relationships are less involved in classroom activities and make less progress on school tasks.

More recently, Ladd, Herald-Brown and Reiser (2008) extended these data by demonstrating that changes in the quality of peer relationships are associated with changes in school achievement and concluded that the exclusion from the peer group “limit the quality and quantity of rejected children’s participation within classroom and playground activities, including those designed to promote learning and scholastic competence” (Ladd, Herald Brown, & Reiser, 2008, p. 1002). Importantly, research suggests that these patterns should be understood in terms of group processes. For example, Chen, Chang and He (2003) have demonstrated with a sample of Chinese children that the concurrent association between school achievement and social variables is moderated by group academic norms, with the relationship being stronger for groups characterized by higher levels of school performance. This result is interesting in that it is the first that shows how group characteristics play an important role on school achievement. However, more research is needed to confirm this result with children in Western cultures.

Another question concerns the direction of causality in the link between social and academic competence. Although this was beyond the scope of the present study (see limitations below), it is worth noting that some studies on Chinese (Chen et al., 2003; Chen et al., 1997) and Western children (Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010; Welsh et al., 2001) have reported reciprocal influences between peer relationships and academic performances. Thus, not only may good peer relations foster academic results, but also a high level of school performance may lead to positive peer relationships. Future research should investigate whether this is a universal or culture-dependent finding.

Finally, there is an important task ahead in considering the interplay between the multiple mediating mechanisms that have already been identified as relevant to the link between social understanding and school achievement. Work with a subsample of children from the present study has shown that the pathway from social understanding at age 5 to academic competence at age 7

and 10 is partially mediated by children's ability to take teachers' criticism into account (Lecce et al., 2014c; Lecce et al., 2011). Lecce and colleagues have also demonstrated that social understanding in primary school-aged children significantly predicts later metacognitive knowledge about reading comprehension (Lecce et al., 2010), and links between metacognition and school performance are well established (Brown, Armbruster, & Baker, 1986; Garner, 1987; Orasanu, 1986; Paris, Cross, & Lipson, 1984). The present study clearly makes a novel contribution in outlining the role played by much wider social dimensions of children's school adjustment, but new research looking in more detail at very specific aspects of children's behaviour in learning contexts (both in terms of performance on academic tasks and in terms of interactions with other children) is now needed to uncover the way in which all of the specific social and cognitive processes come together to influence children's learning in the classroom.

In the course of this kind of research, it would be particularly fruitful to explore the social and cognitive manifestations of social understanding in the classroom for atypically-developing as well as typically-developing children. For example, we know that a large proportion of children and adolescents with autism spectrum disorder have a low level of academic success (Minshew, Goldstein, Taylor, & Siegel, 1994) with strong limitations in reading comprehension (Nation, Clarke, Wright, & Williams, 2006). These may be due to a combination of the cognitive correlates of social understanding (e.g., drawing inferences, Joliffe & Baron-Cohen, 1999; using implicit inferences to form higher level representations, Saldana & Frith, 2007), and the social and communicative correlates of social understanding (e.g., Jones et al., 2009). The precise nature of this combination needs careful attention in future work.

4.2 Practical Implications and Limitations.

Taken together, our findings have also important implications from an educational perspective. Indeed, at a more practical level, results of the present study shed new light on the possible effects of intervention work designed to improve social understanding. We know it is possible to teach children to infer mental states through conversations about belief (Appleton &

Reddy, 1996; Lecce et al., 2014a) and by providing them with explanations for correct responses (Clements, Rustin, & McCallum, 2000) and feedback (Hale & Tager-Flusberg, 2003; Lohmann & Tomasello, 2003; Melot & Angeard, 2003). The present results raise the intriguing possibility that this kind of training can not only improve children's social understanding but can also have an indirect effect on school achievement via the social mediators investigated here. Support for this view comes from theoretical considerations (Hughes & Lecce, 2010; Kloo & Perner, 2008) and empirical data showing that school-based interventions designed to improve children's socio-cognitive understanding have clear benefits in three broad areas: children's feelings, adjustment and achievement (e.g., Banerjee, Weare, & Farr, 2014; Bierman et al., 2008; Durlak & Weissberg, 2007). However, intervention work to evaluate the impact of theory-of-mind training on social and academic outcomes is clearly needed.

Here it is also important to note that caution is warranted in the interpretation of our findings for several other reasons. First, the sample size of the present study is limited and clearly more research with larger and more varied samples is needed to confirm our results. Related to this, even though our sample came from a wide range of social classes, we did not have a sufficiently large sample to work with fine-grained data on socioeconomic background in order to examine how this might impact the results. Therefore, future research investigations could address this issue. Second, the change in the verbal ability measure across time made longitudinal analyses more difficult to interpret. However, given the correlation between the PPVT and the TROG found in the present and existing studies (see Facon, Facon-Bollengier, & Grubar, 2002; Robinson, Mervis, & Robinson, 2003) we do not think that the shift from the PPVT to the TROG had a major effect on our results. Nonetheless, there remains an important question about how different aspects of verbal ability may play a substantive role in all three of the key constructs in this study.

Furthermore, even though we examined verbal ability as a covariate, we have noted above that a variety of other unmeasured factors, such as executive functions, inhibitory control and effortful control, could play an important role in the documented pattern of associations (Blair &

Razza, 2007; Oberle & Schonert-Reichl, 2013; Valiente, Lemery-Chalfant, Swanson, 2010). In a similar way, the construct of social competence itself could be fruitfully decomposed. Further work with more elaborate measures of the different facets of emotion and belief understanding could also help to clarify differentiated links with these outcomes.

Finally, we did not have measures of children's social competence and school outcomes at all three time points. This clearly limits the strength of our conclusions and leaves a number of unresolved issues. For example, on the basis of the present research, it is not possible to evaluate the strength of early social understanding as a predictor of *changes* in school achievement over time; this remains a crucial task for future longitudinal work following children as they get older and academic demands become increasingly salient in the schooling system. Related to this, future research should also evaluate the possible effect of schooling – and the combination of new interactions with peers and adults that this involves – on children's social understanding. Here, as recently suggested by Hughes (2011), comparing children coming from countries in which the beginning of formal schooling occurs at different ages could be a good strategy (see also Hughes et al., 2014; Lecce & Hughes, 2010). In addition, future research should also investigate whether the pathway from early social understanding to later school achievement is independent of previous measures of academic outcome. Thus, although in the present study we controlled for verbal ability, measuring academic performance also at earlier time points would have enabled a more stringent test of our theoretical model.

In sum, the results of the present investigation add to mounting evidence that there is a systematic and theoretically meaningful interplay between the domains of social cognition, interpersonal relationships, and school functioning. Continued work that helps to shed more light on the developmental pathways that connect these domains will be crucial for improving our understanding of – and our capacity to support – children's adjustment at school.

5. References

- Apperly, I. (2011). *Mindreaders. The Cognitive Basis of "Theory of Mind"*. Hove, UK: Psychology Press.
- Appleton, M., & Reddy, V. (1996). Teaching three year-olds to pass false belief tests: A conversational approach. *Social Development*, 5, 275–291. doi: 10.1111/j.1467-9507.1996.tb00086.x
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Banerjee, R., & Watling, D. (2005). Children's understanding of faux pas: Associations with peer relations. *Hellenic Journal of Psychology*, 2, 27–45.
- Banerjee, R., Watling, D., & Caputi, M. (2011). Peer relations and the understanding of faux pas: Longitudinal evidence for bidirectional associations. *Child Development*, 82, 1887-1905. doi: 10.1111/j.1467-8624.2011.01669.x.
- Banerjee, R., Weare, K., & Farr, W. (2014). Working with 'Social and Emotional Aspects of Learning' (SEAL): Associations with school ethos, pupil social experiences, attendance, and attainment. *British Educational Research Journal*, 40, 718-742. doi: 10.1002/berj.3114
- Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., et al. (2008). Promoting academic and social-emotional school readiness: The Head Start REDI program. *Child Development*, 79, 1802-1817. doi: 10.1111/j.1467-8624.2008.01227.x
- Binnie, L. M. (2005). TOM goes to school: Theory of mind understanding and its link to schooling. *Educational and Child Psychology*, 22, 81-93.
- Bishop, D. V. M. (1982). *Test for Reception of Grammar*. Oxford, UK: Oxford University Press.
- Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American Psychologist*, 57, 111–127. doi: 10.1037/0003-066X.57.2.111

- Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*, 78, 647-663. doi: 10.1111/j.1467-8624.2007.01019.x
- Brennan, L. M., Shaw, D. S., Dishion, T. J., & Wilson, M. (2012). Longitudinal predictors of school-age academic achievement: Unique contributions of toddler-age aggression, oppositionality, inattention, and hyperactivity. *Journal of Abnormal Child Psychology*, 40, 1289-1300. doi: 10.1007/s10802-012-9639-2
- Brown, A. L., Armbruster, B. B., & Baker, L. (1986). The role of metacognition in reading and studying. In J. Orasanu (Ed.), *Reading comprehension from research to practice* (pp. 49-75). Hillsdale, NJ: Erlbaum.
- Buhs, E. S. (2005). Peer rejection, negative peer treatment, and school adjustment: Self-concept and classroom engagement as mediating processes. *Journal of School Psychology*, 43, 407-424. doi: 10.1016/j.jsp.2005.09.001
- Buhs, E. S., & Ladd, G. W. (2001). Peer rejection as antecedent of young children's school adjustment: An examination of mediating processes. *Developmental Psychology*, 37, 550-560. doi: 10.1037/0012-1649.37.4.550
- Buhs, E. S., Ladd, G. W., & Herald, S. L. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement?. *Journal of Educational Psychology*, 98, 1-13. doi: 10.1037/0022-0663.98.1.1
- Bukowski, W. M., Sippola, L., Hoza, B., & Newcomb, A. F. (2000). Pages from a sociometric notebook: An analysis of nomination and rating scale measures of acceptance, rejection, and social preference. In A. H. N. Cillessen & W. M. Bukowski (Eds.), *Recent advances in the measurement of acceptance and rejection in the peer system* (pp. 11-26). San Francisco: Jossey-Bass.

- Burr, J. E., & Hofer, B. K. (2002). Personal epistemology and theory of mind: Deciphering young children's beliefs about knowledge and knowing. *New Ideas in Psychology*, 20, 199-224. doi: 10.1016/S0732-118X(02)00010-7
- Burt, K. B., & Roisman, G. I. (2010). Competence and psychopathology: Cascade effects in the NICHD Study of Early Child Care and Youth Development. *Development and Psychopathology*, 22, 557-567. doi: 10.1017/S0954579410000271
- Campbell, S. B., Spieker, S., Burchinal, M., & Poe, M. D. (2006). Trajectories of aggression from toddlerhood to age 9 predict academic and social functioning through age 12. *Journal of Child Psychology and Psychiatry*, 47, 791-800. Doi: 10.1111/j.1469-7610.2006.01636.x
- Caprara, G. V., Barbaranelli, C., Pastorelli, C., Bandura, A., & Zimbardo, P. G. (2000). Prosocial foundations of children's academic achievement. *Psychological Science*, 11, 302-306. doi: 10.1111/1467-9280.00260
- Caputi, M., Lecce, S., Pagnin, A., & Banerjee, R. (2012). Longitudinal effects of theory of mind on later peer relations: The role of prosocial behaviour. *Developmental Psychology*, 48, 257-270. doi: 10.1037/a0025402
- Carpendale, J. I., & Chandler, M. J. (1996). On the distinction between false-belief understanding and subscribing to an interpretive theory of mind. *Child Development*, 67, 1686-1706. doi: 10.1111/j.1467-8624.1996.tb01821.x
- Chen, X., Chang, L., & He, Y. (2003). The peer group as a context: Mediating and moderating effects on the relations between academic achievement and social functioning in Chinese children. *Child Development*, 74, 710-727. doi: 10.1111/1467-8624.00564
- Chen, X., Rubin, K. H., & Li, D. (1997). Relations between academic achievement and social adjustment: Evidence from Chinese children. *Developmental Psychology*, 33, 518-525. doi: 10.1037/0012-1649.33.3.518

- Chen, X., Wang, L., & Cao, R. (2011). Shyness-Sensitivity and Unsociability in Rural Chinese Children: Relations With Social, School, and Psychological Adjustment. *Child Development*, 82, 1531-1543. doi: 10.1111/j.1467-8624.2011.01616.x
- Clements, W. A., Rustin, C. L., & McCallum, S. (2000). Promoting the transition from implicit to explicit understanding: A training study of false belief. *Developmental Science*, 3, 81-92. doi: 10.1111/1467-7687.00102
- Coie, J. D., Dodge, K. A., & Coppotelli, H. (1982). Dimensions and types of social status in the school: A cross-age comparison. *Child Development*, 59, 815-829. Retrieved from: <http://www.jstor.org/stable/1130578>
- Cornoldi, C., & Colpo, G. (1995). *Nuove prove di lettura MT* [New MT tests of reading]. Firenze: Organizzazioni Speciali.
- Cornoldi, C., Lucangeli, D., & Bellina, M. (2002). *AC-MT – Test di valutazione delle abilità di calcolo* [AC-MT - Test for the evaluation of calculation ability]. Trento: Erickson.
- Cutting, A. L., & Dunn, J. (1999). Theory of mind, emotion understanding, language, and family background: Individual differences and interrelations. *Child Development*, 70, 853-865. doi: 10.1111/1467-8624.00061
- Cutting, A., & Dunn, J. (2002). The cost of understanding other people: Social cognition predicts young children's sensitivity to criticism. *Journal of Child Psychology and Psychiatry*, 43, 849-860. doi: 10.1111/1469-7610.t01-1-00047
- Davis, H. A. (2003). Conceptualizing the role and influence of student-teacher relationships on children's social and cognitive development. *Educational Psychologist*, 38, 207-234. doi: 10.1207/S15326985EP3804_2
- Denham, S. (2006). Social-emotional competence as support for school readiness: What is it and how do we assess it?. *Early Education and Development*, 17, 57-89. doi: 10.1207/s15566935eed1701_4

- Denham, S. A., Bassett, H. H., Thayer, S. K., Mincic, M. S., Sirotkin, Y. S., & Zinsser, K. (2012). Observing preschoolers' social-emotional behavior: Structure, foundations, and prediction of early school success. *The Journal of Genetic Psychology, 173*, 246-278. doi: 10.1080/00221325.2011.597457
- De Stasio, S., Fiorilli, C., & Di Chiacchio, C. (2014). Effects of verbal ability and fluid intelligence on children's emotion understanding. *International Journal of Psychology, 49*, 409-414. doi: 10.1002/ijop.12032
- Devine, R. T., & Hughes, C. (2013). Silent films and strange stories: theory of mind, gender, and social experiences in middle childhood. *Child Development, 84*, 989-1003. doi: 10.1111/cdev.12017
- DiPerna, J. C., & Elliott, S. N. (1999). Development and validation of the academic competence evaluation scales. *Journal of Psychoeducational Assessment, 17*, 207-225. doi: 10.1177/073428299901700302
- Dunn, L. M., & Dunn, L. M. (1981). *Peabody Picture Vocabulary Test - Revised*. Circle Pines, MN: American Guidance Service.
- Durlak, J. A., & Weissberg, R. P. (2007). *The impact of after-school programs that promote personal and social skills*. Chicago, IL: Collaborative for Academic, Social, and Emotional Learning (CASEL). Retrieved from: <http://www.casel.org/downloads/ASP-Full.pdf>
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*, 405-432. doi: 10.1111/j.1467-8624.2010.01564.x
- Ensor, R., Spencer, D., & Hughes, C. (2011). 'You feel sad?' Emotion understanding mediates predictors of prosocial behaviour: Findings from 2-to 4-years. *Social Development, 20*, 90-110. doi: 10.1111/j.1467-9507.2009.00572.x

- Entwisle, D. R., & Hayduk, L. A. (1988). Lasting effects of elementary school. *Sociology of Education*, 61, 147-159. doi: 10.2307/2112624
- Facon, B., Facon-Bollengier, T., & Grubar, J. C. (2002). Chronological age, receptive vocabulary, and syntax comprehension in children and adolescents with mental retardation. *Journal of Information*, 107.
- Fergusson, D. M., & Horwood, L. J. (1995). Early disruptive behavior, IQ, and later school achievement and delinquent behavior. *Journal of Abnormal Child Psychology*, 23, 183-199. doi: 10.1007/BF01447088
- Fink, E., Begeer, S., Hunt, C., & de Rosnay, M. (2014). False-Belief Understanding and Social Preference Over the First 2 Years of School: A Longitudinal Study. *Child Development*, 85, 2389-2403. doi: 10.1111/cdev.12302
- Fink, E., de Rosnay, M., Peterson, C., Slaughter, V. (2013). Validation of the Peer Social Maturity Scale for Assessing children's Social Skills. *Infant and Child Development*, 22, 539-552. doi: 10.1002/icd.1809
- Flavell, J. H. (2004). Theory-of-mind development: Retrospect and prospect. *Merrill-Palmer Quarterly*, 50, 274-290. doi: 10.1353/mpq.2004.0018
- Foote, R., & Holmes-Lonergan, H. (2003). Sibling conflict and theory of mind. *British Journal of Developmental Psychology*, 21, 45-58. doi: 10.1348/026151003321164618
- Garner, R. (1987). *Metacognition and reading comprehension*. Norwood, NJ: Ablex.
- Garner, P. W., & Waajid, B. (2008). The associations of emotion knowledge and teacher-child relationships to preschool children's school related developmental competence. *Journal of Applied Developmental Psychology*, 29, 89-100. doi: 10.1016/j.appdev.2007.12.001
- Golan, O., Baron-Cohen, S., & Golan, Y. (2008). The 'reading the mind in films' task [child version]: Complex emotion and mental state recognition in children with and without autism spectrum conditions. *Journal of Autism and Developmental Disorders*, 38, 1534-1541. doi: 10.1007/s10803-007-0533-7

- Goodman, R. (1997) The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry*, 38, 581-586. doi: 10.1111/j.1469-7610.1997.tb01545.x
- Gordis, F. W., Rosen, A. B., & Grand, S. (1989, April). *Young children's understanding of simultaneous conflicting emotions*. Paper presented at the Biennial meeting of the Society for Research in Child Development. Kansas City, MO.
- Graziano, P. A., Reavis, R. D., Keane, S. P., & Calkins, S. D. (2007). The role of emotion regulation in children's early academic success. *Journal of School Psychology*, 45, 3-19. doi: 10.1016/j.jsp.2006.09.002
- Gresham, F. M., & Elliott, S. N. (1990). *The Social Skills Rating System: Examiner's Manual*. Circle Pines, MN: American Guidance Services.
- Grueneisen, S., Wyman, E., & Tomasello, M. (2015). Children use salience to solve coordination problems. *Developmental Science*, 18, 495-501. doi: 10.1111/desc.12224
- Hale, C. M., & Tager-Flusberg, H. (2003). The influence of language on theory of mind: A training study. *Developmental Science*, 6, 346-359. doi: 10.1111/1467-7687.00289
- Hamre, B. K., & Pianta, R. C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*, 72, 625-638. doi: 10.1111/1467-8624.00301
- Harris, P. L., Johnson, C., Hutton, D., Andrews, G., & Cooke, T. (1989). Young children's theory of mind and emotion. *Cognition and Emotion*, 3, 379-400. doi: 10.1080/02699938908412713
- Hohm, E., Jennen-Steinmetz, C., Schmidt, M. H., & Laucht, M. (2007). Language development at ten months: Predictive of language outcome and school achievement ten years later?. *European Child & Adolescent Psychiatry*, 16, 149-156. doi: 10.1007/s00787-006-0567-y
- Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, 3, 424. doi: 10.1037/1082-989X.3.4.424

- Hughes, C. (2011). *Social understanding and social lives: From toddlerhood through to the transition to school*. Hove, UK: Psychology Press.
- Hughes, C., Adlam, A., Happé, F., Jackson, J., Taylor, A., & Caspi, A. (2000). Good test-retest reliability for standard and advanced false-belief tasks across a wide range of abilities. *Journal of Child Psychology and Psychiatry*, 41, 483-490. doi:10.1111/1469-7610.00633
- Hughes, C., Devine, R. T., Ensor, R., Koyasu, M., Mizokawa, A., & Lecce, S. (2014). Lost in Translation? Comparing British, Japanese, and Italian Children's Theory-of-Mind Performance. *Child Development Research*.
- Hughes, C., & Ensor, R. (2007). Positive and protective: effects of early theory of mind on problem behaviors in at-risk preschoolers. *Journal of Child Psychology and Psychiatry*, 48, 1025-1032. doi: 10.1111/j.1469-7610.2007.01806.x
- Hughes, C., & Ensor, R. (2009). Independence and interplay between maternal and child risk factors for preschool problem behaviors?. *International Journal of Behavioral Development*, 33, 312-322.
- Hughes, C., & Ensor, R. (2011). Individual differences in growth in executive function across the transition to school predict externalizing and internalizing behaviors and self-perceived academic success at age 6. *Journal of Experimental Child Psychology*. doi:10.1016/j.jecp.2010.06.005
- Hughes, C., & Lecce, S. (2010). Early Social Cognition. In R. Tremblay, R. G. Barr, R. DeV. Peters, & M. Boivin (Eds.), *Encyclopaedia on Early Childhood Development* [online]. Montreal, Quebec: Centre of Excellence for Early Childhood Development; 2010: 1-6. Retrieved from: <http://www.child-encyclopedia.com/pages/PDF/Hughes-LecceANGxp.pdf>.
- Hughes, C., & Leekam, S. R. (2004). What are the links between theory of mind and social relations? Review, reflections and new directions for studies of typical and atypical development. *Social Development*, 13, 590-619. doi:10.1111/j.1467-9507.2004.00285.x

Izard, C. E., Fine, S. E., Schultz, D., Mostow, A. J., Ackerman, B. P., & Youngstrom, E. (2001).

Emotion knowledge as a predictor of social behaviour and academic competence in children at risk. *Psychological Science*, 12, 18-23. doi: 10.1111/1467-8624.00505

Joliffe, T., & Baron-Cohen, S. (1999). A test of central coherence theory: Linguistic processing in high-functioning adults with autism or Asperger syndrome. Is local coherence impaired?. *Cognition*, 71, 149-185. doi: 10.1016/S0010-0277(99)00022-0

Jones, C. R., Happé, F., Golden, H., Marsden, A. J., Tregay, J., Simonoff, E., Pickles, A., Baird, G., & Charman, T. (2009). Reading and arithmetic in adolescents with autism spectrum disorders: Peaks and dips in attainment. *Neuropsychology*, 23, 718-28. doi: 10.1037/a0016360

Kloo, D., & Perner, J. (2008). Training theory of mind and executive control: A tool for improving school achievement?. *Mind, Brain, and Education*, 2, 122-127. doi: 10.1111/j.1751-228X.2008.00042.x

Kuhn, D., & Pearsall, S. (2000). Developmental origins of scientific thinking. *Journal of Cognition and Development*, 1, 113-119. doi: 10.1207/S15327647JCD0101N_11

Ladd, G. W. (2005). Children's peer relations and social competence: A century of progress. New Haven, CT: Yale University Press.

Ladd, G. W. (2003). Probing the adaptive significance of children's behaviour and relationships in the school context: A child-by-environment perspective. In R. Kail (Ed.), *Advances in Child Behavior and Development* (pp. 43-104). New York, NY: Wiley.

Ladd, G., Herald Brown, S., & Reiser, M. (2008). Does chronic classroom peer rejection predict the development of children's classroom participation during the grade school years?. *Child Development*, 79, 1001-1015. doi: 10.1111/j.1467-8624.2008.01172.x

Ladd, G. W., Kochenderfer, B. J., & Coleman, C. C. (1997). Classroom peer acceptance, friendship, and victimization: Distinct relational systems that contribute uniquely to children's school adjustment?. *Child Development*, 68, 1181-1197. doi: 10.1111/j.1467-8624.1997.tb01993.x

Lecce, S., Bianco, F., Demicheli, P., & Cavallini, E. (2014). Training Preschoolers on First-Order

- False Belief Understanding: Transfer on Advanced ToM Skills and Metamemory. *Child Development*, 85, 2404-2418. doi: 10.1111/cdev.12267
- Lecce, S., Bianco, F., Devine, R., Hughes, C., & Banerjee, R. (2014a). Promoting theory of mind in middle childhood: A training study. *Journal of Experimental Child Psychology*, 126, 52-67. doi: 10.1016/j.jecp.2014.03.002
- Lecce, S., Caputi, M., & Hughes, C. (2011). Does sensitivity to criticism mediate the relationship between theory of mind and academic competence?. *Journal of Experimental Child Psychology* 110, 313-331. doi: 10.1016/j.jecp.2011.04.011
- Lecce, S., Caputi, M., & Pagnin, A. (2009). "I know what you mean": A study of individual differences in children's internal state talk in relation to school competence. *Journal of Applied Psycholinguistics*, 3, 83-98.
- Lecce, S., Caputi, M., & Pagnin, A. (2014b). Long-term effect of theory of mind on school achievement: The role of sensitivity to criticism. *European Journal of Developmental Psychology*, 11, 305-318. doi: 10.1080/17405629.2013.821944
- Lecce, S., Caputi, M., & Pagnin, A. (2014c). False-belief understanding at age 5 predicts beliefs about learning in Year 3 of primary school. Manuscript submitted for publication.
- Lecce, S., & Hughes, C. (2010). "The Italian Job"?: Comparing theory of mind performance in British and Italian children. *British Journal of Developmental Psychology*, 28, 747-766. doi: 10.1348/026151009X479006
- Lecce, S., Zocchi, S., Pagnin, A., Palladino, P., & Taumoepeau, M. (2010). Reading minds: The relation between children's mental state knowledge and their metaknowledge about reading. *Child Development*, 81, 1876-1893. doi: 10.1111/j.1467-8624.2010.01516.x
- van Lier, P. A., Vitaro, F., Barker, E. D., Brendgen, M., Tremblay, R. E., & Boivin, M. (2012). Peer victimization, poor academic achievement, and the link between childhood externalizing and internalizing problems. *Child Development*, 83, 1775-1788. doi: 10.1111/j.1467-8624.2012.01802.x

- Lockl, K., & Schneider, W. (2007). Knowledge about the mind: Links between theory of mind and later metamemory. *Child Development*, 78, 148-167. doi: 10.1111/j.1467-8624.2007.00990.x
- Lohmann, H., & Tomasello, M. (2003). The role of language in the development of false belief understanding: A training study. *Child Development*, 74, 1130-1144. doi: 10.1111/1467-8624.00597
- Lynch, M., & Cicchetti, D. (1997). Children's relationships with adults and peers: An examination of elementary and junior high school students. *Journal of School Psychology*, 35, 81-99. doi:10.1016/S0022-4405(96)00031-3
- Maguire, M. C., & Dunn, J. (1997). Friendships in early childhood, and social understanding. *International Journal of Behavioral Development*, 21, 669-686. doi: 10.1080/016502597384613
- Malecki, C. K., & Elliott, S. N. (2002). Children's social behaviors as predictors of academic achievement: A longitudinal analysis. *School Psychology Quarterly*, 17, 1-23. doi: 10.1521/scpq.17.1.1.19902
- Mashburn, A. J., & Pianta, R. C. (2006). Social relationships and school readiness. *Early Education and Development*, 17, 151-176. doi: 10.1207/s15566935eed1701_7
- McDermott, P. A., Leigh, N. M., & Perry, M. A. (2002). Development and validation of the preschool learning behaviors scale. *Psychology in the Schools*, 39, 353-365. doi: 10.1002/pits.10036
- McKown, C., Russo-Ponsaran, N. M., Allen, A., Johnson, J. K., & Warren-Khot, H. K. (2015). Social-Emotional Factors and Academic Outcomes Among Elementary-Aged Children. *Infant and Child Development*. doi: 10.1002/icd.1926
- Melot, A. M., & Angeard, N. (2003). Theory of mind: Is training contagious?. *Developmental Science*, 6, 178-184. doi: 10.1111/1467-7687.00269

- Milligan, K., Astington, J. W., & Dack, L. A. (2007). Language and theory of mind: Meta-analysis of the relation between language ability and false-belief understanding. *Child Development*, 78, 622–646. doi: 10.1111/j.1467-8624.2007.01018.x
- Minshew, N. J., Goldstein, G., Taylor, H. G., & Siegel, D. (1994). Academic achievement in high functioning autistic individuals. *Journal of Clinical and Experimental Neuropsychology*, 16, 261-270. doi: 10.1080/01688639408402637
- Nation, K., Clarke, P., Wright, B., & Williams, C. (2006). Patterns of reading ability in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 36, 911-919. doi: 10.1007/s10803-006-0130-1
- Newcomb, A. F., Bukowski, W. M., & Pattee, L. (1993). Children's peer relations: A metaanalytic review of popular, rejected, neglected, controversial, and average sociometric status. *Psychological Bulletin*, 113, 99–128. doi: 10.1037//0033-2909.113.1.99
- Oberle, E. & Schonert-Reichl, K. A. (2013). Relations among peer acceptance, inhibitory control, and math achievement in early adolescence. *Journal of Applied Developmental Psychology*, 34, 45-51. doi: 10.1016/j.jecp.2014.03.002
- Orasanu, J. (1986). *Reading comprehension from research to practice*. Hillsdale, NJ: Erlbaum.
- Paris, S. G., Cross, D. R., & Lipson, M. Y. (1984). Informed strategies for learning: A program to improve children's reading awareness and comprehension. *Journal of Educational Psychology*, 7, 1239-1252. doi: 10.1037/0022-0663.76.6.1239
- Perner, J., Kain, W., & Barchfeld, P. (2002). Executive control and higher-order theory of mind in children at risk of ADHD. *Infant and Child Development*, 11, 141-158. doi: 10.1002/icd.302
- Peterson, C. C., Slaughter, V. P., & Paynter, J. (2007). Social maturity and theory of mind in typically developing children and those on the autism spectrum. *Journal of Child Psychology and Psychiatry*, 48, 1243-1250. doi: 10.1111/j.1469-7610.2007.01810.x

- Pianta, R. C., Steinberg, M. S., & Rollins, K. B. (1995). The first two years of school: Teacher-child relationships and deflections in children's classroom adjustment. *Development and Psychopathology*, 7, 295-312. doi: <http://dx.doi.org/10.1017/S0954579400006519>
- Pons, F., & Harris, P. L. (2000). *Test of Emotion Comprehension-TEC*. Oxford, UK: Oxford University Press.
- Pons, F., & Harris, P. L. (2002). *Theory of mind test (TMT)*. Cambridge, MA: Harvard University Press.
- Randell, A., & Peterson, C. (2009). Affective qualities of sibling disputes, mothers' conflict attitudes, and children's theory of mind development. *Social Development*, 18, 857-874. doi: 10.1111/j.1467-9507.2008.00513.x
- Robinson, B. F., Mervis, C. B., & Robinson, B. W. (2003). The roles of verbal short-term memory and working memory in the acquisition of grammar by children with Williams syndrome. *Developmental Neuropsychology*, 23, 13-31. doi: 10.1080/87565641.2003.9651885
- Roorda, D. L., Koomen, H. M., Spilt, J. L., & Oort, F. J. (2011). The Influence of Affective Teacher–Student Relationships on Students’ School Engagement and Achievement A Meta-Analytic Approach. *Review of Educational Research*, 81, 493-529. doi: 10.3102/0034654311421793
- Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development*, 6, 111-135. doi: 10.1111/j.1467-9507.1997.tb00097.x
- Ryan, A. M. & Ladd, G. W. (2012) (Eds.). *Peer relationships and adjustment at school*. Charlotte, NC: Information Age Publishing.
- Saldana, D., & Frith, U. (2007). Do readers with autism make bridging inferences from world knowledge?. *Journal of Experimental Child Psychology*, 96, 310–319. doi: 10.1016/j.jecp.2006.11.002
- Sharp, C. (2006). Mentalizing problems in childhood disorders. In J. Allen, & P. Fonagy (Eds.), *Mentalizing: A guide for therapists* (pp. 201–212). Chichester: Wiley.

- Sharp, C. (2008). Theory of Mind and conduct problems in children: Deficits in reading the “emotions of the eyes”. *Cognition and Emotion*, 22, 1149-1158. doi: 10.1080/02699930701667586
- Sharp, C., Croudace, T. J., & Goodyer, I. M. (2007). Biased mentalizing in children aged seven to 11: Latent class confirmation of response styles to social scenarios and associations with psychopathology. *Social Development*, 16, 181-202. doi: 10.1111/j.1467-9507.2007.00378.x
- Shields, A., Dickstein, S., Seifer, R., Gusti, L., Magee, K. D., & Spritz, B. (2001). Emotional competence and early school adjustment: A study of preschoolers at risk. *Early Education and Development*, 12, 73–96. doi: 10.1207/s15566935eed1201_5
- Slaughter, V., Imuta, K., Peterson, C. C., & Henry, J. D. (2015). Meta-analysis of theory of mind and peer popularity in the preschool and early school years. *Child Development*, 86, 1159–1174. doi:10.1111/cdev.12372
- Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, 25, 173-180. doi: 10.1207/s15327906mbr2502_4
- Stella, G., Pizzoli, C., & Tressoldi, P. E. (2000). *Peabody Picture Vocabulary Test-Revised*. Torino: Omega Edizioni.
- Sullivan, K., Zaitchik, D., & Tager-Flusberg, H. (1994). Preschoolers can attribute second-order beliefs. *Developmental Psychology*, 30, 395-402. doi:10.1037/0012-1649.30.3.395
- Taanila, A., Murray, G. K., Jokelainen, J., Isohanni, M., & Rantakallio, P. (2005). Infant developmental milestones: A 31-year follow-up. *Developmental Medicine & Child Neurology*, 47, 581–586. doi: 10.1017/S0012162205001155
- Trentacosta, C. J., & Izard, C. E. (2007). Kindergarten children's emotion competence as a predictor of their academic competence in first grade. *Emotion*, 7, 77-88. doi: 10.1037/1528-3542.7.1.77

- Valiente, C., Lemery-Chalfant, K., & Swanson, J. (2010). Prediction of kindergartners' academic achievement from their effortful control and emotionality: Evidence for direct and moderated relations. *Journal of Educational Psychology, 102*, 550-560. doi: 10.1037/a0018992
- Véronneau, M. H., Vitaro, F., Brendgen, M., Dishion, T. J. Tremblay, R. E. (2010). Transactional analysis of the reciprocal links between peer experiences and academic achievement from middle childhood to early adolescence. *Developmental Psychology, 46*, 773-790. doi: 10.1037/a0019816
- Vygotsky, L. (1962). *Thought and language*. Cambridge, MA: MIT Press.
- Wellman, H. (2016). Social cognition and education: theory of mind. Pensamiento Educativo. *Revista de Investigación Educativa Latinoamericana, 53*, 1-23. doi: 10.7764/PEL.53.1.2016.14
- Wellman, H., Phillips, A., & Rodriguez, T. (2000). Young children's understanding of perception, desire, and emotion. *Child Development, 71*, 895-912. doi: 10.1111/1467-8624.00198
- Welsh, M., Parke, R. D., Widaman, K., & O'Neil, R. (2001). Linkages between children's social and academic competence: A longitudinal analysis. *Journal of School Psychology, 30*, 463-481. doi: 10.1016/S0022-4405(01)00084-X
- Wentzel, K. R. (1993). Does being good make the grade? Social behavior and academic competence in middle school. *Journal of Educational Psychology, 85*, 357. doi: 10.1037/0022-0663.85.2.357
- Wimmer, H., & Hartl, M. (1991). Against the Cartesian view on mind: Young children's difficulty with own false beliefs. *British Journal of Developmental Psychology, 9*, 125-138. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)2044-835X](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)2044-835X)
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition, 13*, 103-128. doi: 10.1016/0010-0277(83)90004-5

Ziv, Y. (2013). Social information processing patterns, social skills, and school readiness in preschool children. *Journal of Experimental Child Psychology, 114*, 306-320. doi: 10.1016/j.jecp.2012.08.009

6. Appendix

Belief Understanding

At Time 1 we administered two standard first-order false-belief tasks: an unexpected content (Wimmer & Hartl, 1991) and an unexpected transfer task (Wimmer & Perner, 1983). In each task children were credited with one point if they correctly answered both the experimental and the control question. We also administered two second-order false-belief stories based on the simpler second-order task developed by Sullivan, Zaitchik and Tager-Flusberg (1994). Each story involved a first- and a second-order false-belief question as well as control reality questions. In each story and for each type of false-belief question (1st and 2nd order) children were credited with success (one point) only if they passed both the test and the control question. Finally, we administered two belief-desire reasoning tasks presenting either a nice surprise or a nasty surprise (Harris, Johnson, Hutton, Andrews, & Cooke, 1989). Each story involved a first-order false-belief and then an emotion-based-on-false-belief question as well as control reality questions. Again, children were credited with success (one point) only if they passed both the test and the control question. Therefore possible scores on false-belief understanding at Time 1 range from 0 to 10.

At Time 2 and 3 we administered a selection of items from the Theory of Mind Test (TMT - Pons & Harris, 2002). The TMT evaluates ten components of theory of mind (Flavell, 2004): (a) Level 1 perspective taking; (b) Level 2 perspective taking; (c) Understanding of intentionality; (d) Understanding of ignorance; (e) Understanding of 1st order false belief; (f) Understanding of the distinction between appearance and reality; (g) Understanding of lies; (h) Understanding of jokes; (i) Understanding of 2nd order false belief; (j) Understanding of double-bluff. Considering the age of participants we administered a selection of 10 items out of 30: 2 items for each of components (g) and (h) and 3 items for each of components (i) and (j). Score range: 0-10.

Emotion understanding

At Time 1 children's understanding of emotions was assessed via the Gordis task (Gordis, Rosen, & Grand, 1989). It is made up of six stories of a storytelling interview used by many studies

(e.g., Caputi et al., 2012; Hughes et al., 2000; Lecce & Hughes, 2010; Lecce et al., 2011; Maguire & Dunn, 1997). In the first "explain" set, children were told three stories, in which it was made explicit that the protagonist felt two conflicting emotions and children were asked to explain why the character felt each emotion. Below an example is given: "Steve's mother is taking him to the swimming pool tomorrow. His best friend David is going to come too. But that evening, David telephones and says he can't go swimming because he has the flu. So Steve will have to go on his own". In the second "infer + justify" set, children were told three stories, and asked both to infer and explain how the character felt. Children's answers were scored: 0 for no emotions explained/stated, 1 for one emotion (e.g., I was sad because David could not come"), or 2 for two opposite-valence emotions (e.g., I was happy because I went to the swimming pool but I was also a bit sad because David could not swim with me"). Possible scores therefore ranged from 0 to 12 points. Coding was completed by the two authors of the present paper; 20% of the transcripts were independently double-coded and a Cohen's kappa of .86 supported the reliability of this coding.

At Time 2 and 3 we administered a selection of items from the Test of Emotion Comprehension (TEC - Pons & Harris, 2000). The TEC evaluates nine components of emotion understanding: (I) Emotion understanding based on facial expression; (II) Understanding of external causes of emotion; (III) Emotion understanding based on desires; (IV) Emotion understanding based on beliefs; (V) Understanding of the influence of a reminder on the present emotional state; (VI) Understanding of the capacity to control a felt emotion; (VII) Understanding of the capacity to hide an emotion; (VIII) Understanding of mixed emotions; (IX) Understanding of moral emotions. Considering the age of participants, children in the present study were administered components 4 to 9. Score range: 0-6.